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ABSTRACT

A longitudinal study was designed to develop and evaluate a screening instrument of developmental delay based on parental assessment of 18-month-old children. The reliability and validity of a parental screening instrument based on the Griffiths Mental Developmental Scale was investigated with a sample of 2,783 Swedish children out of a population of 3,245. In order to establish concurrent validity, the children with scores in the lowest two percent were tested with the Griffiths Mental Developmental Scale; correlation with parental assessment was .87. To determine the predictive validity of the assessment, children were screened for mental retardation and other learning disabilities at 8 and 14 years. A comparison of parental assessment scores and test scores of low-scorers at 18 months with follow-up results showed that the two assessment methods yielded a similar prediction rate of 65 percent. However, follow-up studies also revealed false positives among low-scoring children identified at 18 months; reasons for this are discussed. It is concluded that parents are able assessors of development if they are provided with an instrument developed for that purpose. (JDD)

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EARLY DIAGNOSIS BY PARENTAL DEVELOPMENTAL SCREENING

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INTRODUCTION

For individual as well as educationl and societal reasons, it is of greatest importance that mentally retarded children are identified as early as possible. The importance of early identification and habilitation is well known.

The participation of parents in the assessment of their children's development has been recognized as an important part of developmental diagnosis, but systematic methods of obtaining information from parents about their chidren's development and data regarding its validity are rare. Examples include the Vineland Social Maturity Scale (Doll, 1953), the Minnesota Child Development Inventory (Ireton and Thwing, 1974) and the Denver Developmental Screening Test (Frankenburg and Dodds, 1967).

Developmental information from parents usually has been obtained in a "history - taking" fashion, often without reference to norms for interpretation. It has been regarded as important additional information, but often has been considered inadequate or insufficient because of its presumed lack of objectivity. However, if parental assessment could be proven reliable and valid, it would have several advantages over professional early

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The primary aim of this longitudinal study was to develop and evaluate a screening instrument of developmental delay based on parental assessment of 18 months old children. The reliability and validity of a parental screening instrument based on the Griffiths Mental Developmental Scale was investigated in a population of 3 245 18-month-old children. In order to establish concurrent validity two per cent low scoring children were tested with the Griffiths Mental Developmental Scale the correlation with parental assessment being .87. The prevalence of mental retardation and learning disabilities was investigated in follow up studies of eight and 14-year-olds. These studies identified all mentally retarded among lowscoring or attrition cases at 18 months. Other learning disabilities were reported for 51.2% low-scoring children and 18.5% controls at eight year follow up. The corresponding figures at 14 years were 26.6% and 4.6%. A comparison between parental assessment scores and test scores of low scorers at 18 months with follow up results shows that the two assessment methods yielded similar prediction around 65%.

It was shown that parents are able assessors of development if they are provided with an instrument developed for that purpose. The clinical utility of this screening instrument corresponds with similar instruments administered by professionals.

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assessment. First, from an early stage it would involve parents in structured observations of their children and for children needing habilitation this would probably enhance co-operation between parents and professionals. Second, as the children would be observed over an extended period in their own homes, as opposed to a welfare centre, a more valid estimation may be gained. Third, it would be a less time-consuming and cheaper screening procedure.

These considerations provided the basis for the present study, which was initiated by the Stockholm County Council Board of Habilitation (Brüde and Vidlund, 1973). The purpose of the study was to develop a simple screening instrument for 18-month-old children which could be administered entirely by parents and which had good reliability and predictive validity. The aim was to identify children who could be future recipients of services under the Act on Provisions for Mentally Retarded Persons or other remedial education.

MATERIAL AND METHODS

Screening instrument

The screening instrument consists of 40 items taken from the Griffiths Mental Developmental Scale (Griffiths, 1954) transformed into questions which can be answered yes or no. The selected items describe modes of behaviour generally mastered between the ages of 10 to 15 months. Like all screening

instruments it is expected to differentiate "downwards". The modes of behaviour sampled are in the areas of Gross and Fine Motor, Social and Language development and Performance. The first 16 items may serve as an example.

Insert Appendix about here

Insert Table I about here

Assessments and samples

Table I shows assessment and follow-up samples. The socio-economic status of the participating families in the parental assessment study is not known. As this sample constitutes all children of a certain age living in Stockholm city and county the distribution of the total population in this area - manual workers 36 %, non-manual employees 59 % and self-employed 5 % may serve as a guideline (Statistics Sweden, 1970). An absolute agreement between the socio-economic distribution of the total population and families with 18-month-old children, however, cannot be assumed.

Parental assessment. The questionnaire was mailed to all parents with children born during a two-month period and living in the Stockholm area; a total of 3 245 children.

Professional assessment. To determine the reliability of the parental assessments experienced psychologists assessed a random sample of 311 children previously assessed by parents

using the same questionnaire filled in by parents. Professionals were blind with respect to the child's score as assigned by the parents.

Psychological testing. The test used as a concurrent validity check was the Griffiths Mental Developmental Scale. Two per cent low-scoring children from the parental assessment were selected for testing by psychologists. This cut-off point in the distribution was chosen as a general estimation of mentally retarded children in a population is 2 %. The examiners were thus not blind with respect to the socre of each child as assigned by the parents.

Follow-up. To determine the predictive validity of parental assessments at 18 months, children were screened for mental retardation and other learning disabilities at 8 and 14 years.

Firstly, a nationwide survey of all Boards for Provisions and Services for the Mentally Retarded was conducted to identify which children from the entire 18 months population had been registered. Secondly, a total of 186 children were screened for learning disabilities. This sample consisted of the 2 % lowest scoring children on the parent questionnaire with 18 months scores of 0-28 (57). To determine an 18 months score below which children would be at risk for future learning disabilities, children with scores 29-30 (48), i.e. another 2 % were added to this potential "at risk" group. A randomly selected group of children with scores 31-40 (81) was included

for control purposes. Information concerning school achievement was collected through a questionnaire with fixed response alternatives. Follow up criteria were the following: 1) An evaluation of "not ready to start school" after being given a test of readiness for school attendance. 2) Placement in a class for preparation for school readiness or a preparatory clinic. 3) Rec ving other educatinal support. 4) Attendance at a speech clinic. 5) Psychological and/or psychiatric evaluation and treatment. For these children a questionnaire was mailed to school psychologists. In the follow up at 14 years information about general adaptation at school, class room behaviour and contact with peers was included. Response alternatives in the questionnaires were fixed.

RESULTS

Parental assessment at 18 months

Completed parental questionnaires were received for 2 783 (85.8%) children. The total attrition rate ws 462 (14.6%).

Prychometric properties of the instrument

The reliability of the instrument was 0.81 calculated by Kuder-Richardson KR_{20}. Item reliability was calculated by Kendall tau-b and an overall coefficient of 0.43 was obtained. The mean percent agreement between parents and professionals was 90.6 %. Statistically significant differences were found

for 21 out of the 40 items. No statistically significant differences were found between assessments across the five developmental areas or totally. For discussion of the psychometric properties of the instrument and the special problems of screening instruments yielding skewed distributions of data, I refer to the original publications of the scale (Sonnander, 1987 a, 1987b).

Psychological testing

The children tested with the Griffiths test scores between stanine 1 and 7 with 38 (88%) scoring up to and including stanine 2. Three children scored between 3 and 4 and two scored 5 and 7 respectively. The latter two were thus not low scorers according to test results. Correlations between test scores and parental assessment scores calculated by Spearman's rank were around 0.80 for all developmental areas and 0.87 for the total scale.

Insert Table IV about here

Follow-up at 8 years

Mental retardation. A total of 20 children from the entire population selected for assessment at 18 months (3 245) were at eight years administratively classified as mentally retarded. This information was obtained from the Boards for Provisions

and Services for the Mentally Retarded. This represents 0.62 % of the population. The comparative figure for the entire Swedish population of eight-year-olds is 0.51 %.

Fifteen of the children classified as mentally retarded were at 18 months low-scorers and five were attrition cases, i.e. no parental questionnaires were returned. Furthermore as six children (four with Down's syndrome and two with severe brain damage) of the 15 assessed were identified as retarded prior to the 18 months asessment the follow up showed correct prediction of administratively classified mental retardation for nine children on the basis of parental assessment alone. The IQ of these children is not known, but from other information available in medical records etc. eight were assessed as severely mentally retarded (SMR) and seven as mildly mentally retarded (MMR).

Other learning disabilties. Services suggesting learning disabilities were found for 42 (51.2%) of the originally low-scoring children while the corresponding figure for controls was 15 (18.5%).

Table IV shows the distribution of true and false positives and negatives at eight years across parental assessment scores at 18 months. The two groups differed significantly regarding educational support ($X^2 = 23.96$, $p<0.001$). True positives were characterized by multiple problems and received support implying

general developmental delays, i.e. school start postponed, placement in class for school readiness or preparatory clinic frequently in combination with other educational support in specific subjects such as reading, writing and mathematics. False negatives were characterized by specific reading and writing disorders. Moreover, half of the true positives, but no controls, had been referred for psychological evaluation. Test resulats indicated below IQ 70 performance.

Insert Table VI about here

Follow-up at 14 years

Children identified as mentally retarded at eight years were still registered as such at 14 years. One more low-scoring child had been registered at the age of 10. Information provided by school psychologists showed that at age fourteen 20 (26.6%) of the low-scoring children received educational support implying learning disabilities. The corresponding figure for controls was three (4.6%). Several children had improved in both groups, but the significant difference remained (X^2 = 18.45, $p<0.001$). The prevalence of administratively classified mentally retarded was at 14 years 0.65 %.

A number of children receiving educational support had adjustment and social difficulties as well.

Insert Table V about here

Discriminative power

Analyses of the instrument showed that no single item, combination or developmental area had special discriminating power. This could only be assigned to the sum total of items mastered. True and false positives and tru and false negatives were compared by t-test and no differences were found for single items or developmental areas. From the results it appears that children mastering less than 75 % of the items at 18 months could be at risk for later mental retardation or other learning disabilities.

DISCUSSION

The purpose of the study was to evaluate a screening instrument for developmental delay and how well it identified future recipients of services for the mentally retarded and children with learning disorders in need of special education in their regular classes.

The concurrent validity established for low scores by the Griffiths test was comparable with outcomes from similar studies of preofessional assessments (Ireton et al, 1977).

The screening instrument correctly predicted for age eight 56 % of low scoring children and 81 % of children with high scores. These figures correspond well with results from a

comparable study of the Denver Developmental Screening Test (Van Doornick et al, 1976).

Mental retardation and school achievement problems were chosen as follow up criteria. Both of these criteria are influenced by several parameters. The relativity inherent in the concept of mental retardation ought to be mentioned. Heber's definition of mental retardation, which is the guide-line for the Swedish Act on Provisions for the Mentally Retarded, inlcudes both below average intellectual functioning and impairment of adaptive behaviour. It is a well-known fact that all children who fulfill the psychometric criterion do not necessarily have to leave their regular classes. Among chilrden with learning difficulties necessitating special support half were tested and had IQ's below 70. The quality of their adaptive behaviour as well as available special educational resources at their school may account for them not being labeled as mentally retarded.

However, the follow up studies also yielded false positives, i.e. low scorers at 18 months who were netiher mentally retarded nor had learning difficulties. This "improvement" can be accounted for in several ways. The predictive validity of screening intruments is limited and they often over-identify since their purpose is to identfy children at risk. However, these are flaws they share with traditional infant tests. Also the amount of habilitation these children may have received before follow up is unknown as are their rearing conditions in

general. There is also reason to believe that being offered remedial education or other educational services in the normal school depends on both the actual need of the child, how need is defined by teachers and school authorities and availability of remedial services in that particular school.

In order to investigate reasons for improvement of false positives pre- and perinatal complications were compared across eight-year follow up groups. In this later study it was hypothesized that true positives would be more afflicted than false positives although this discrepancy had no main effect on developmental status at 18 months. A comparable difference between false and true neagtives was expected. In summary the results support the outcome of the eight-year follow up study, i.e. amount of non-favorable conditions is related to amount of remedial services received when comparisons are made across groups.

It should be stressed that a lowscoring child is only at risk and maybe only temporarily so. Continous follow up is advisable so that early remedial measures can be taken if necessary.

This study shows that parents are able to complete a questionnaire on the devlopmental progress of their children which can be used to detect and predict retardation and the need for educational support. The data also imply that, even though the reliability of parental assessments cannot be demonstrated convincingly due to e.g. characteristics of the scale, they are useful for

detection and prediction purposes. This parental questionnaire may be useful in picking out children not already identified as retarded, or those who are likely to need educational support services. Early remedial measures are likely to be of most use for children in these two groups.

The contribution of this study is that parental assessments of developmentally delayed children were as useful as professional assessments of such children. The advantages of involving parents in the developmental progress of their children should be considered when planing services for preshool children.

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APPENDIX

Questionnaire

Age level (mths)	
10	1. Can the child grasp a small object (about 1 cm thick) with the thumb opposite the index finger (the so-called pincer grip)?
14	2. Can the child roll a ball along the floor?
11	3. If you hide a toy so that the child can see it, under an inverted cup, can the child then find the toy by lifting the cup? N.B. The child's interest being directed to the toy, not the cup.
12	4. Does the child obey simple commands such as 'Give me the ball'?
15	5. Can the child point to its own nose?
13	6. Can the child look <u>with interest</u> at pictures in a book or magazine?
11	7. Can the child stand, holding e.g. onto a piece of furniture for at least 10 sec.?
15	8. Can the child turn the pages of a book, even if it is several at once?
13	9. Can the child climb a flight of steps unaided?
15	10. Can the child say at least <u>five</u> distinct words (not necessarily in sequence) and always use them to denote the same objects?
13	11. Does the child prefer to use one hand instead of both simultaneously, e.g. when it grasps a small object such as a building block?
2	12. Does the child meet the eyes of another individual so that real contact is established?
11	13. If you pat or caress the child does it then show affection in return, e.g. by a pat?
12	14. Does the child try to save or protect itself when it falls?
12	15. If the child has a small object (e.g. a building block) in each hand, can it then accept a third object without dropping one of the others?
15	16. Can the child point to its own mouth?

/From: Developmental Medicine and Child Neurology, 1987, 29, 351-362/

Table I

Parental and professional assessment, testing and follow up: description of samples and sampling methods across sex, twin/singleton, and residential area

	Parental assessment Total Population	Professional assessment Random sample	Griffiths test Stratified sample	Follow up 8 years Stratified/ random sample	Follow up 14 years Stratified/ random sample
Boy	1 637	171	37	67(36)*	67(36)*
Girl	1 608	140	20	38(45)*	38(45)*
Quadruplets	4	-	-	-	-
Twin	44	10	11	11(0)	11(0)
Singleton	3 197	301	46	94(81)	94(81)
City	1 101	124	20	16(1)	16(1)
Town area	1 966	170	32	83(76)	83(76)
Rural area	178	17	5	6(4)	6(4)

*) numbers in brackets indicate controls

Table II

Distribution of true and false positives and negatives at eight years across parental assessment scores at 18 months

Follow up results		Parental assessment scores at 18 months: 0 - 30	31 - 40	
Mental retardation / Support implying learning disabilities	True positives	9*	0	False negatives
		42	15	
No support or mental retardation	False positives	40	66	True negatives
Attrition		8	0	

*) Six children identified as mentally retarded at 18 months excluded

Table III

Distribution of true and false positives and negatives at 14 years across parental assessment scores at 18 months

Follow up results		Parental assessment scores at 18 months: 0 - 30	31 - 40	
Mental retardation ---------- Support implying learning disabilities	True positives	10*	0	False negatives
		20	3	
No support or mental retardation	False positives	55	62	True negatives
Attrition		14	16	

*) Six children identified as mentally retarded at 18 months excluded

Table IV

Deviant behaviour at school

Behaviour	Low scoring children	Controls
Bullying (by others)	7(4)*	1
Disruptive class room behaviour	1	2
Concentration deficit	13(7)	3
Withdrawn	21(9)	6(2)

*) numbers in brackets indicate children with educational support for which deviant behaviour was reported as well

Paper presented at the International Conference on Family Support (1st, Stockholm, Sweden, August 14-19, 1988)